Coping with the Flood: The Next Phase

Evolution of Floodplain Management

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The Nation has made great progress in applying and gaining acceptance of various measures as principal means of reducing economic and environmental losses resulting from major flood events to acceptable levels. This progress has been particularly noteworthy over the past 25 years.

The Midwest flood of 1993 and other severe storms in that and other recent years, however, have been sobering reminders of work yet to be done to further reduce our vulnerability to extreme natural events. In a year of hard lessons, this flood heightened awareness, interest, and debate regarding appropriate uses of vulnerable areas; whether governmental programs (particularly federal) reward inappropriate behavior; and who should pay for the risk many seem willing to assume.

Before examining the work yet to be done it would perhaps be instructive to briefly examine the evolution of approaches to dealing with flood problems; list some recent accomplishments; and, based on the record to date, suggest how the Nation and its political subdivisions should deal with flood problems and improve its overall floodplain management efforts.

The Evolution of Approaches

Approaches to dealing with floods in the United States have changed significantly since the first efforts, started in the early 1800s, to direct the paths of floodwaters. These changes have been particularly dramatic during the past 75 years and have been largely event driven.

Flood mitigation initially centered on structural measures to modify flooding, principally through the employment of flood protection levees. For more than a century levees were in particular favor along the lower Mississippi River to overcome the propensity of the river to overflow the vast and rich alluvial valley which it had created. Individual, group and state efforts to confine the great river were immeasurably aided when Congress, after a series of subsequent flood events, created the Mississippi River Commission in 1879 to devise a comprehensive solution to recurrent flooding. From that time forward the Congress gradually became reconciled to the idea that the federal government had some degree of responsibility to control flood waters. The Commission soon settled on the levees only approach to control flooding on the lower Mississippi (Moore, J.W. and D.P., 1989).

When much of the levee system along the lower river was overwhelmed by the Great Flood of 1927, with massive human suffering and losses, demonstrating that levees alone were an inadequate solution to flood problems, the Nation turned to consideration of other approaches. Congress authorized the Corps of Engineers to carry out surveys and to make general plans for all river basins (except the Colorado River, where the Bureau of Reclamation had jurisdiction).

Several major floods in the 1930s quickened the pace and resulted in legislative measures providing for increasing federal assumption of the costs for flood control projects. In the Flood Control Act of 1936, Congress formally recognized that floods were a menace to national welfare, declared flood control a proper federal responsibility, and articulated national policy regarding the control of flood waters. In the Flood Control Act of 1938, congress changed its cost-sharing provisions providing for federal assumption of the entire cost of both reservoir and channel modification projects. From that period until the early 1950s, during the height of activity, Congress spent more than $11 billion on projects primarily to store flood waters. The need for flood protection structures in upstream watersheds was also recognized by the Congress in 1954 in enacting the Watershed Protection and Flood Prevention Act (Public Law 566). This act authorized the Department of Agriculture's Soil Conservation Service to participate in comprehensive watershed management projects in cooperation with states and their subdivisions.

Even as these projects were being put in place there were those that questioned the wisdom of over reliance on structural measures to control the paths of flood waters. Broader solutions to the Nation's flood problems were advocated. Wise land use management practices within flood prone areas seemed to many enlightened observers to be a neglected alternative to existing flood protection construction programs.

This alternative was first applied on a broad scale by the Tennessee Valley Authority (TVA). This federal agency was created by Congress in 1933 as a government corporation armed with powers to plan, construct, and

operate multipurpose water resource development projects within the Tennessee River basin. Having basically completed its initial mission of bringing about the maximum degree of flood control feasible, TVA turned its attention to the many areas that received little or no flood protection from its flood water detention reservoir system. Working with state and local planners the agency's water resources engineers in 1953 embarked on a pioneer cooperative program to tackle local flood problems. Under this program flood damage prevention was considered a matter of adjusting the use of the land to the conditions existing in areas subject to flooding. Reports identifying local flood hazards were prepared by TVA to provide a sound technical basis for flood damage prevention planning.

After only a few years of experience, TVA was convinced that this floodplain management assistance program had real merit and was suitable for national application. A report was submitted to Congress in 1959 proposing "A Program for Reducing the National Flood Damage Potential." (Committee on Public Works, 1959). TVA staff freely shared their experiences and expertise and carried out extensive promotional efforts of this floodplain management concept nationally.

The Corps of Engineers were authorized in the Flood Control Act of 1960 to provide technical service and planning assistance to communities for wise use of the floodplain. Instrumental in bringing about this authorization were two reports published by the University of Chicago in 1958, "Regulating Flood Plain Development" (Murphy, 1958) and "Changes in Urban Occupance of Floodplains" (White et al., 1958), a national conference on floodplain regulation and flood insurance held by the Council of State Governments which recommended that one federal agency be directed by Congress to publish local flood risk data for the Nation, and Senate review of the 1959 TVA report. The Corps subsequently prepared and published local floodplain information reports patterned after the TVA experience. By the early 1960s both the Soil Conservation Service and the U.S. Geological Survey were also carrying out local floodplain mapping efforts and providing floodplain management assistance.

The most significant step toward a more unified federal policy for managing the Nation's floodplains came in 1965, with the establishment of a Bureau of the Budget Task Force on Federal Flood Control Policy. The Task Force's report was published the following year (Task Force on Federal Flood Control Policy, 1966). Citing numerous problems—such as mounting flood losses, inadvertent encouragement of floodplain encroachments, increasing damage potential under existing policies, and the inability of current programs to prevent catastrophes—the report advocated a broader perspective on flood control within the context of floodplain development and use.

While this report provided the groundwork for redirecting the federal involvement from structural control to a more comprehensive approach for management of the floodplain, two major legislative items were also significant—establishment of the National Flood Insurance Program (NFIP) in 1968 and the passage of the National Environmental Policy Act (NEPA) in 1969.

Congress had, for some time, been interested in a national flood insurance program, recognizing that disaster insurance would be a more fiscally prudent public policy than relief and other forms of federal assistance. The program that finally emerged was built upon the recommendations of the Task Force.

Through the NFIP, relief from the impacts of flood damages in the form of federally subsidized flood insurance became available to participating communities, contingent on flood loss reduction measures embodied in local floodplain management regulations. The federal government would carry out studies to determine local flood hazard areas within which appropriate land-use regulations would be applied. The one-percent annual chance ("100-year") flood was adopted as a minimum national standard for these and other floodplain management measures.

Passage of the National Flood Insurance Act marked an important change in federal flood control policy. Primary responsibility for managing the floodplains still remained with local government, but now development was to occur consistent with the flood risk. The act's premise was to return to the landowner the cost for his/her locational decision, and to provide for an accounting of the total cost in any decision regarding occupancy and use of flood hazard areas, and thereby shift the burden from the taxpayer.

Changes in federal flood control policies were happening at the same time that a growing interest in the environment was occurring. Although there were a number of single-purpose federal laws and programs to protect various natural resources (e.g., national parks and forests, wildlife habitat, open space for conservation and recreation), it was not until passage of NEPA in 1969 that the natural resources of floodplains and other natural systems were formally recognized and incorporated in the federal decision-making process. This act declared environmental quality to be a national goal and established a procedure for assessing the environmental impact of proposed federal projects and programs which could significantly affect the environment. Thus, the legislative and administrative foundation was formally laid for an evaluation of the environmental resources associated with river corridors and coastal zones.

These efforts were subsequently aided by the creation of an Office of Wetlands Protection within the U.S. Environmental Protection Agency, to carry out nonregulatory

wetland protection initiatives, and by the National Park Service's Rivers, Trails and Conservation Assistance Program, which was designed to help state and local governments to carry out assessments of river corridor resources and to prepare conservation plans.

Parallel with these efforts to redirect federal policy in dealing with economic and environmental losses was a growing federal role in disaster response and recovery.

Until 1950 Congress enacted relief bills from time to time to aid victims of specific disasters, dating from the 1815 New Madrid earthquake. In legislation enacted in 1950, Congress recognized that some disasters would be of such severity that relief and rehabilitation would be beyond the financial capabilities of state and local governments. State governments could request the President to declare a major disaster and, if granted, the federal government could provide assistance to supplement state and local efforts. By the early 1960s Congress had ushered in the direct subsidy or grant as a federal disaster relief policy. Legislation permitted the forgiveness of loans for the reconstruction of homes, small businesses and farms damaged by natural disasters. Since then some form of grant provision has been included in virtually every subsequent disaster relief act.

The evolution of floodplain management in the United States today has come from the gradual merger of three policy streams—flood control, resource protection and disaster assistance. A graphical representation is of-

Evolution of Floodplain Management in the United States

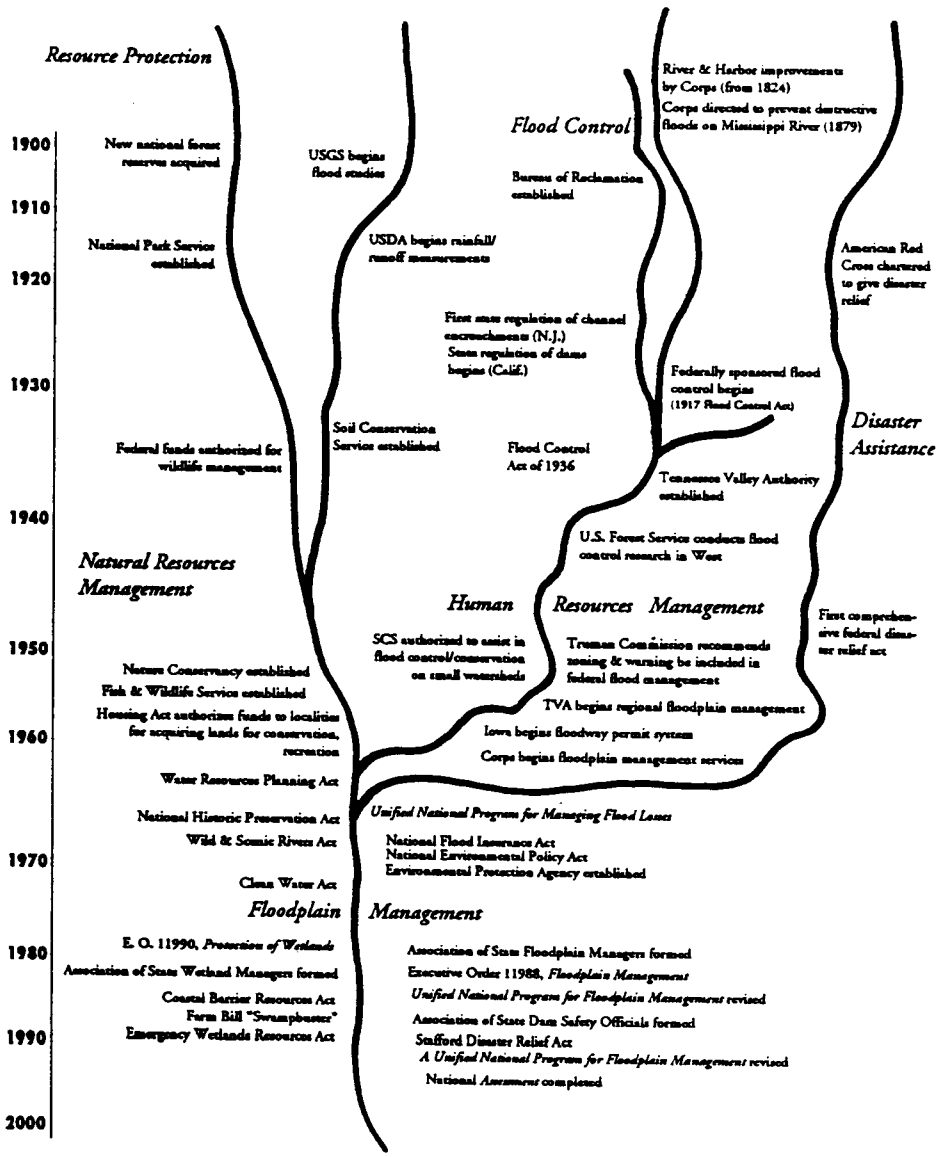

Figure 1

Source: "A Unified National Program for Floodplain Management," Draft, 1994

fered in Figure 1. To be successful, any efforts to modify policies and approaches for improved management of the Nation's floodplains will have to take full account of the present interdependency of these policy streams.

Some Recent Accomplishments

Over the past three decades in particular, the Nation has made significant progress in its floodplain management efforts. This progress has been strongly influenced by the National Flood Insurance Program and the National Environmental Policy Act; other subsequent federal legislation; enabling legislation in several states; and many other forces, factors, and events that affect floodplain dynamics. As a Nation we have seen during this period:

- The employment of a variety of new approaches and the creation of new programs to deal with the Nation's flood problems.
- The emergence of the NFIP as the dominant federal activity for dealing with the consequences of flooding and providing incentives for appropriate land uses in flood hazard areas.
- A growing awareness, recognition and acceptance, and efforts to protect the natural and beneficial resources (and hence, resource values) provided by relatively undisturbed riverine and coastal floodplains.
- The existence of several (but not enough) very active and highly successful state floodplain management programs, such as those in Minnesota, Virginia, and Wisconsin, which represent the partnership effort needed to effectively implement the floodplain management approach at the local level where hard and difficult (but necessary) decisions concerning appropriate land uses are being made.
- Almost universal adoption at the local level of regulations controlling or setting standards for further floodplain development in order to participate in the NFIP. Among these are a number of localities (perhaps several hundred), such as Frankfort, KY; Kampsville, IL; Maricopa County, AZ; and Tulsa, OK, that have developed really innovative programs employing a combination of floodplain management measures to achieve broad community goals.

Some conditions have tempered this progress:

- At the individual decision making level, a continuing willingness to take risks in locational decisions involving occupancy and use of floodplains, whether riverine or coastal. Federal disaster assistance has supplemented this courage. Because locational amenities seem to greatly outweigh any risk concerns, the rate of growth in floodplains is almost twice the Nation's rate of growth.
- Typically "political" responses to disasters because of the lack of predisaster planning and postdisaster know-how and capability. This lack of planning and capability can be usually explained by the expectations of local governments that, after a disaster, federal aid will follow. Recent trends demonstrate that federal disaster assistance is supplanting, not supplementing, local and state efforts. The massive federal flood control construction program of the 1930-1950 era now seems to be replaced by massive federal relief and recovery assistance for flood disasters in the present era.

Further insight into the present situation may be gained from a recently completed assessment of floodplain management in the United States (Federal Interagency Floodplain Management Task Force, 1992).

Some Work Yet To Be Accomplished

In looking at what has been accomplished and an assessment of the present situation, there are still some disturbing trends and situations that, if unaltered, will continue to present barriers to the way many professionals believe the Nation should utilize its riverine and coastal floodplains. A long list could be developed but this writer suggests that national efforts be concentrated in six general areas.

Achieve a proper accounting of flood risk in decision making. The number of flood-related deaths in the Nation has declined from the level that prevailed early in this century but overall flood losses have continued to increase. Those who develop, occupy, provide support for, and otherwise use our floodplains, and those who regulate their use, each without taking proper account of the hazards involved, are major contributors to our present problems. As a Nation, we have fallen far short of making policy and land use decision makers aware of risk data and how to understand and use it. Further studies and efforts are required to improve on this record.

Further integrate flood loss reduction and resource protection strategies. A considerable portion of the Nation's most diverse and important natural and cultural resources are contained within its river corridors and coastal zones. Over the past few decades better methodologies have been developed to identify and quantify these resources. These situations provide both a need and a process for integrating these two aspects of floodplain management to make it truly effective. Although some progress has been made, substantial impediments remain. Many of the existing

programs are applied within differing geographic areas and are triggered by different events. Integration will require a better understanding of how the two concepts relate to each other, a possible reformulation of goals, and work at all levels to minimize conflicts in their application to specific situations.

Build floodplain management capability at all governmental levels. Enhanced training, especially that which takes a comprehensive view of floodplain management, is needed to both support and carry out floodplain management efforts. A common lack of familiarity with *all* available floodplain management techniques typically biases the investigation and selection of solutions to problems.

The goal of capability development would be a vastly improved understanding of flood loss reduction techniques and of the natural and beneficial resources of floodplains. The end result is wider application of various floodplain management measures, particularly at the local level. A key strategy is the building of greater state and local capability to complement or supplement federal efforts.

Achieve the intent of the National Flood Insurance Program. Despite a number of important successes, such as identification of flood hazard areas and increased local controls over inappropriate use of floodplain lands, the National Flood Insurance Program has not met the Congressional intent of transferring the cost of floodplain occupancy and use from the taxpayer to the individual. Nationally, less than 20 percent of structures and their contents in identified hazard areas are covered by flood insurance policies. This situation is compounded by the failure of many in the private sector to act responsibly in assessing the flood risk or in requiring measures to protect investments.

Avoid political responses to flood disasters. Truly major flood events have resulted in "political" solutions. After disaster strikes, local communities often have the political power to secure disaster assistance, despite the stated policy to require that an increasing proportion of the risk be borne by state and local government. Copious amounts of federal disaster assistance, liberal grants, and other payments are provided to rebuild and restore the community or region as rapidly as possible to pre-flood conditions or even intensify floodplain use during redevelopment to await the next flood to repeat the cycle. Efforts to transfer all or at least a part of the cost of floodplain occupancy and use to the individual (a precept of the National Flood Insurance Program) are thwarted, and many carefully planned and well-thought-out programs are undermined or rendered ineffective. Imprudent behavior is rewarded and state and local fiscal responsibility made irrational.

Employ some bold new approaches. Many observers believe that because current floodplain management efforts have not enjoyed the degree of success envisioned, some "bold new approaches" are warranted. These may include steps that could forge a broader water resources management program (including river corridor, wetlands, and natural resources management) of which floodplain management would be a part.

There are others advocating the integration of flood loss reduction strategies and measures with those for other natural hazards such as land subsidence, earthquakes, dam failures, and hurricanes. The Nation appears to be moving towards an integrated hazard management policy.

An Agenda for Water Resources Education and Research

The Nation is entering a new era in hazards and emergency management, one in which a comprehensive multihazard approach, a strong emphasis on mitigation, and use of technological advances will play leading roles. These changes will require the building of capability for employment of multidisciplinary approaches in arriving at sound and acceptable solutions to floods and other natural hazards. They also suggest a research agenda.

Changes in water resources education can assist in building this capability. After all, floodplain management is but part of broader water and related land resources management. The general lack of understanding by professional floodplain managers, typically engineers and planners of the various flood loss reduction and resource protection strategies and measures and how they could be effectively integrated, has limited the record of accomplishments to date. Inclusion of other disciplines in the core curricula, would aid in preparing students for natural hazards management careers. Courses dealing with various natural hazards could also be offered. The author has prepared a course that provides a comprehensive view of floodplain management, which he teaches at the University of Tennessee.

Some research topics may be implicit as the Nation enters a new era in hazards management. Although water resources is but one of many disciplines involved in mitigating floods and other natural hazards, it can assist, through research, in expanding that knowledge from its field of perspective. Several lists of research needed to improve floodplain management efforts have been developed and published by various agencies and organizations over the past decade (Changnon, et al., 1983, and Association of State Floodplain Managers, 1986). Many of these research items would greatly expand our knowledge areas and narrow our information gaps.

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